





Claim 9 (Original): The method of claim 8, wherein the shunt capacitances are measured at five different frequencies.

Claim 10 (Original): The method of claim 2, wherein the pre-determined value is approximately 10 percent.

Claim 11 (Original): The method of claim 2, wherein the calculation is performed in accordance with the relationship:

$$\Delta C_o = C_s - C_o,$$

where  $C_s$  is the capacitance at an off-resonance frequency which is stored in memory and  $C_o$  is the shunt capacitance.

Claim 12 (Previously Presented): The method of claim 1, wherein said determining step comprises the steps of:

applying an ultrasonic drive signal to the transducer across a pre-defined frequency range;

measuring the hand piece impedance;

determining whether a phase difference between the voltage and current of the hand piece is less than a predetermined value;

measuring the hand piece impedance a pre-established number of times;

computing a hand piece average shunt capacitance;

incrementing the drive signal by a set frequency value;

determining whether the drive frequency is greater than a pre-set frequency or whether a number of impedance measurements is greater than a pre-defined number; and

if the result of the determining step is positive, computing an average shunt capacitance value at each drive frequency.

Claim 13 (Original): The method of claim 12, further comprising the step of:

incrementing the drive signal by the set frequency value, if the absolute value of the hand piece phase difference is greater than the predetermined value; and

returning to the step of measuring the hand piece impedance.

Claim 14 (Original): The method of claim 13, wherein the set frequency value is 25 Hz and the predetermined value is 89.5°.

Claim 15 (Original): The method of claim 12, wherein the predefined frequency range is from approximately 34 kHz to 44 kHz.

Claim 16 (Original): The method of claim 12, further comprising the step of:

performing a calculation to determine whether the hand piece is within acceptable temperature limits; and

providing a warning, if the transducer temperature is not within acceptable limits.



measuring a first hand piece shunt capacitance when a user first activates the hand piece/blade;

measuring a second hand piece/blade shunt capacitance when the surgeon deactivates the hand piece/blade;

calculating a time difference between when the hand piece/blade is activated and deactivated using a time when the first measured hand piece/blade shunt capacitance is obtained and a time when the second measured hand piece/blade shunt capacitance is obtained;

computing a rate of change value of the hand piece/blade shunt capacitance using the calculated time difference;

determining whether the rate of change value of the hand piece/blade shunt capacitance is greater than a predetermined threshold above a value stored in memory; and

providing a warning to the user, if the rate of change value of the hand piece/blade shunt capacitance is greater than the predetermined threshold above the value stored in memory.

Claim 22 (Withdrawn): The method of claim 21, wherein the predefined frequency range is from approximately 34 kHz to 44 kHz.

Claim 23 (Withdrawn): The method of claim 21, wherein said computing step comprises the step of:

dividing a difference between the first measured hand piece/blade shunt capacitance and the second measured hand piece/blade shunt capacitance by a difference in time between when the first measured hand piece/blade shunt capacitance is obtained and when the second measured hand piece/blade shunt capacitance is obtained.



$$Z_{HP} = af_o^2 + bf_o + c,$$

where a, b and c are constants which are calculated via the curve fit and  $f_o$  is a fixed frequency at which the hand piece impedance is measured.

Claim 28 (Currently Amended): The method of claim 22~~1~~, wherein the pre-defined frequency range is from approximately 34.5 kHz to 44.5 kHz.

Claim 29 (Original): The method of claim 26, wherein the fixed frequency interval is 50 Hz.

Claim 30 (Original): The method of claim 26, wherein the shunt capacitance is calculated in accordance with the relationship:

$$C_o = -\left(\frac{1}{f_o}\right) * \left(Z_{HP}^2 - \frac{1}{R_p^2}\right)^{1/2} - (C_{v1} * C_{v2}) / (C_{v1} + C_{v2}) + \frac{1}{(f_o^2 * L_t)} - C_c - C_{pcb},$$

where  $C_o$  is the shunt capacitance,  $f_o$  is a fixed frequency at which the hand piece impedance is measured,  $Z_{HP}$  is the hand piece impedance at the fixed frequency  $f_o$ ,  $R_p$  is a value of a limiting resistor,  $C_{v1}$  and  $C_{v2}$  are values of voltage dividing capacitors,  $L_t$  is a value stored in memory of the generator which represents a transducer tuning inductor,  $C_c$  is a capacitance of a hand piece cable and  $C_{pcb}$  is a contribution of capacitance from a printed circuit board in the generator.

Claim 31 (Original): The method of claim 26, wherein the group of distinct impedance values comprises eleven impedance values.



Claim 32 (Original): The method of claim 26, wherein the equally spaced frequency values are spaced apart at 1000 Hz intervals.